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Means-Tested Unemployment Benefit and Family Labour Supply: A Dynamic Analysis

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Abstract

The effect of means-testing of unemployment benefit paid to married men on the labour supply of their wives is a relatively neglected topic in the analysis of the disincentive effects of unemployment benefits. Such analysis as has occurred has been undertaken in a static framework, neglecting the fact that any disincentive from means-testing lasts only as long as the husband is unemployed. We introduce dynamics by using a two-period model to study the decision of the wife whether or not to work when her husband becomes unemployed. In the second period there is uncertainty about future job opportunities for both husband and wife. The model is capable of explaining participation behaviour that may seem non-optimal if analyzed in a purely static context.

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1 Introduction

In many OECD countries the labour force participation of women married to unemployed men is found to be considerably and significantly lower than that of women married to employed men.¹ There are a variety of reasons that could be responsible for this phenomenon. Unemployment may be unevenly distributed among regions, or men who are more likely to lose their jobs may have selected wives who likewise have a higher propensity to become unemployed. In the case of Britain, a number of recent empirical papers emphasize the family means-test in part of the unemployment benefit system as a possible explanation for this phenomenon (Dilnot and Kell (1987), Garcia (1989, 1991), Kell and Wright (1990)). These contributions analyse a neglected aspect of the literature on unemployment benefits and incentives. In the situation where the husband's unemployment benefit is means-tested on family income there is a sharp reduction in husband's benefit if the wife works, implying a disincentive to her labour supply. We investigate this situation using a theoretical model which provides for intertemporal considerations which we believe are important to the problem.

We assume a means-tested unemployment benefit of the type described below. Our description is based loosely on the main features of British social assistance benefit *Income Support* (IS), its forerunner *Supplementary Benefit* (SB), and the German unemployment assistance *Arbeitslosenhilfe* (AH) and social assistance *Sozialhilfe* (SH) schemes. These benefits are a prominent part of the income support systems for the unemployed in Britain and Germany, existing alongside unemployment insurance benefit.² (The features we describe may also be found in other countries where means-testing of unemployment benefit is important e.g. Australia where all unemployment benefit is means-tested.)

An unemployed husband receives a benefit means-tested on family income of

¹For information on eleven countries, see Micklewright and Giannelli (1991), Table 1.

²IS and AH are received by about two-thirds and one-third of the male unemployed stock in Britain and Germany respectively (Micklewright, 1990, Figure 1b, and Brinkmann, 1988, Table 2). One million Germans who received SH at some time during 1988 reported loss of employment as the main reason (Clasen, 1991, Table 1)

maximum size b . The level of b could depend on the number of children (IS, SB, AH, SH), housing costs (SB, SH), region (SH), and past earnings (AH). If the wife works, the husband's benefit is reduced, unit for unit, in respect of any earnings of the wife above a threshold k and up to the level $k + b$, at which point benefit entitlement expires. In Britain, k does not vary with household characteristics while in Germany it increases with the number of children in the case of the AH scheme. Assuming that the couple pool their income, there is in effect a 100% marginal tax rate when the wife's earnings are in the range $[k, k + b]$. Accordingly, one might expect the optimal policy for the family where the husband is eligible for the means-tested benefit to take account of the disincentive for the wife. One solution involves supply of the wife's labour so as to result in earnings below the threshold k . An obvious way to do this is through non-participation in the labour market.

This purely static explanation of the wife's behaviour, implicit in the above mentioned literature, suffers from a major drawback. It implies that either the husband stays unemployed forever or that the wife is certain of a job offer in the future at the same wage as any current offer. There are no intertemporal considerations which enter the family's decision making while the husband is unemployed. These considerations could be expected to be important where in reality the mean length of a spell of unemployment may be less than 6 months and where the labour market for the wife - like that for her husband - may not be perfect. As a consequence, the static model struggles to explain why some women do appear to supply labour with earnings in the range $[k, k + b]$, i.e. where the 100% implicit tax rate binds (see for example Dilnot and Kell, 1987). Analysed in a static framework, this behaviour is either non optimal or reflects demand side constraints which result in labour supply on the flat segment of the budget constraint as being optimal.

In our model we recognise explicitly that the disincentive to the wife's labour supply is *temporary*, lasting only so long as the husband stays unemployed. We thus consider the family's optimisation problem in an dynamic context. This allows for intertemporal considerations and as a result rationalises behaviour which is difficult to explain in a static framework. We introduce uncertainty about both the length of the husband's spell of unemployment and the wife's future job prospects. Using

a two-period model, we show that if (a) the decision of the wife not to work in period 1 reduces the probability of getting an equivalent job in period 2, and if (b) the husband receives a job offer in period 2 with some positive probability, then the wife may participate in period 1, despite an implicit 100% marginal tax rate at the margin. She will do this if the disadvantage from working due to the means-test is out weighed by a future gain resulting from this decision.

2 Labour Supply, Means-Testing and Uncertainty

We use a two-period model and assume husband and wife act so as to maximise a family utility function.³ Jobs are offered at the beginning of each period. The decision whether or not to accept an offer has also to be made at this time. We assume that the husband receives any offer and takes his decision before the wife decides about any offer she receives. Once employed or unemployed, the status has to be maintained over the whole period. (We assume a two-state world and use the terms unemployment and non-participation interchangeably to describe the state of non-employment.) There is no utility from leisure nor disutility from work. The family maximises indirect utility obtained from income in the two periods.

We are interested in the participation behaviour of women who are married to unemployed men. Therefore, we assume that the husband does not receive a job offer in period 1 and is unemployed throughout that period. In order that the entitlement to unemployment benefit can exist for the husband we assume that this unemployment was initiated involuntarily.⁴ Note that we do not rule out the possibility of earlier periods of unemployment for the husband. His spell of unemployment in period 1 may be the continuation of an existing spell in which limited duration unemployment insurance benefit, free of a means-test, may have been received at an earlier date.

³The means-test's impact in reducing one partner's income through another partner's actions suggests that a bargaining approach could be a useful alternative in future work.

⁴Penalties to voluntary unemployment are a standard feature of unemployment benefit schemes (Atkinson and Micklewright, 1991).

At the beginning of period 2, the husband will get a job offer with probability p , with $0 \leq p \leq 1$. The wife receives a job offer for period 1 with certainty.⁵ This could simply be an offer of continued work in a job held prior to her husband becoming unemployed. If the wife turns down this offer we assume she will get a job offer at the beginning of period 2 only with probability $q < 1$, while she receives an offer with certainty should she accept the period 1 offer.⁶ In other words, if the wife accepts the period 1 offer, she can be certain of retaining her job in the second period. We justify these assumptions below.

To keep the model simple, we assume that in both periods there is only one type of job for the wife, paying earnings w^F for a fixed labour supply, and one type of job for the husband, paying w^M also for fixed hours. (Single hours-wage packages are all that is available to both husband and wife.) While unemployed, the husband receives a benefit means-tested on family income of maximum size b . We assume that the husband's opportunity cost of working is lower than $w^M - b$. He will therefore accept any job offer in period 2.

If the wife participates in the labour market, her earnings have no implications for her husband's unemployment benefit up to an amount k . All earnings above k result in a reduction of b at the rate of 100%, so long as $w^F < k + b$, at which point her husband's benefit is extinguished. In other words, her net contribution to family income in the range between k and $k + b$ is zero. In the case that the wife does not work, the family receives the equivalent of the opportunity costs of her employment, v .

The wife's opportunity costs v may include travel-to-work costs, expenses on eating outside the house during working hours, and expenses for child care. There is likely to be a fixed opportunity cost for any labour supply and a rising cost with increasing labour supply in line with, for example, increasing child-care. It is

⁵We wish to study the decisions of women who do have the possibility of working in the first period.

⁶The simplifying assumption that the wife receives a job offer in period 2 with probability one, should she accept the period 1 offer, could easily be relaxed as long as the probability that the wife receives an offer in period 2 is higher if she accepts the period 1 job offer.

possible that the opportunity cost may include unemployment benefit for the wife.⁷

The assumptions about the wife's period 2 job offer probabilities are crucial to the model. The state dependence in labour market transitions which is implied here may be justified on several grounds. A quit from an pre-existing job in period 1 will result in a loss of any insider status. As a result, the wife may be excluded from regaining the job with certainty in the future. The acceptance of a job offer, on the other hand, or the continued employment within an existing job, confers insider status and a continuing employment probability, partly through labour law.⁸

Should the wife accept the period 1 job offer she contributes an amount s to the family's income, where

$$s = \begin{cases} k & \text{if } k < w^F < b + k \\ k + [w^F - (b + k)] & \text{if } w^F \geq b + k \end{cases} \quad (1)$$

We assume $v < w^F$, $k < w^F$, and $s < v$. The wife's one-period earnings if she works are greater than her one-period opportunity cost of not working; the fixed wage-hours package results in earnings above the threshold level disregarded by the means-test; her contribution to one-period family income is lower if she accepts the offer. In other words, we concentrate on those situations in which if the family behaved myopically, as in a static model, the wife would never participate so long as her husband was eligible for means-tested unemployment benefit.

⁷On the other hand, the rejection of a job offer entails the risk of disqualification from benefit in the typical unemployment benefit system. This may occur with high probability if non-participation is the result of a voluntary quit (as may be the case for the wife in our model in period 1) since this is a relatively easy event for benefit authorities to monitor. Atkinson and Micklewright (1991) provide some information on the incidence of disqualification from unemployment benefit.

⁸Our assumptions rule out other factors which would produce the same qualitative effect on incomes and decision-making as that of state dependence in transitions. Quitting could lead to future search costs or lower future wages even if job offers in the future were always certain. We prefer our formulation as capturing what we see as the basic nature of many labour markets: people in jobs cannot be sure of taking an "unemployment holiday" with certainty; people who get a job offer know that they may not get one in the future; people with jobs often expect them to continue.

[Figure 1 about here]

Figure 1 gives an example. The vertical axis measures the wife's net contribution to family income. The horizontal axis measures her earnings. The flat segment between k and $k + b$ of the schedule relating earnings to the net contribution represents the operation of the means-test. The dashed line indicates the opportunity costs of offering time to the labour market. The intercept denotes the fixed component of her opportunity costs, \bar{v} . The upward slope of the line indicates rising opportunity costs with labour supply. If the earnings from the job offered to the wife lie between v_1 and v_2 , her opportunity costs of accepting the job would be higher than her net contribution to family income. A static model would predict that this woman will not accept an hours-wage package implying earnings in this range. Our analysis below shows that this is not necessarily the case when intertemporal considerations have been taken into account.

Risk-neutral behaviour

With risk-neutrality the family's objective is to maximize lifetime income, I , given by

$$I = I^1 + \frac{1}{(1+r)} I^2 \quad (2)$$

where I^1 and I^2 denote first- and second period income, respectively, and r the discount rate. Given our assumptions, the control variables of the family's optimization problem are the wife's decision whether or not to accept any job offers in period 1 and in period 2. The problem is a dynamic programming problem in its simplest form and solvable by backward reduction. Since the probability of receiving a job offer in period 2 depends on the wife's participation decision in period 1, the family's expected period 2 income is a function of the wife's period 1 decision. Let the binary variable d^i , $i = 1, 2$, indicate the wife's decision on any job offer in period i , were an offer to be received (she always receives an offer in period 1 by assumption); $d^i = 0$ signifies that she would reject an offer and $d^i = 1$ signifies that she would accept. Let the probability of an offer in period 2 be $q(d^1) = q$, with $0 < q < 1$ if $d^1 = 0$,

and $q(d^1) = 1$ if $d^1 = 1$.

Consider first the wife's decision in period 2. The family's expected income in this period should the husband receive a job offer (which he would always accept), $E(I_{Emp}^2)$, is given by:

$$E(I_{Emp}^2) = \max \{ [w^M + q(d^1) w^F + (1 - q(d^1)) v], [w^M + v] \}. \quad (3-a)$$

If the husband receives no period 2 offer, expected period 2 income, $E(I_{Ump}^2)$, will be:

$$E(I_{Ump}^2) = \max \{ [b + q(d^1) s + (1 - q(d^1)) v], [b + v] \}. \quad (3-b)$$

The first terms in square brackets in (3-a) and (3-b) represent family period 2 income should the wife be prepared to accept a period 2 job offer ($d^2 = 1$). The second terms represent the income should the wife decline any period 2 offer she receives.

Given assumptions $w^F > v > s$ stated earlier, it is the ^{first} second term in (3-a) and the first term in (3-b) which represent maximum family income. The wife's optimal decision is to accept any offer in period 2 if her husband gets an offer and to reject it if he does not. These decisions reflect the removal of the implicit tax imposed by the means-test if he gets an offer and its continued effect if he does not. Since the model has only two periods there is no need in the latter case for the wife to take account of any impact of her decision on future offer probabilities. The wife therefore reacts to the means-test disincentive as if it were permanent.

Taking into account the probability of the husband receiving an offer, expected period 2 income is therefore:

$$E(I^2) = p E(I_{Emp}^2) + (1 - p) E(I_{Ump}^2) = p[w^M + q(d^1) w^F + (1 - q(d^1)) v] + (1 - p)[b + v] \quad (4)$$

The family's present value of expected lifetime income now depends only on the wife's period 1 decision:

$$E(I) = \max \left\{ \left[b + s + [p(w^M + w^F) + (1-p)(b+v)] \frac{1}{(1+r)} \right], \right. \\ \left. \left[b + v + [p(w^M + q w^F + (1-q)v) + (1-p)(b+v)] \frac{1}{(1+r)} \right] \right\} \quad (5)$$

The expression in the first line of (5) represents family's lifetime income should the wife accept her (by assumption certain) job offer in period 1. The expression in the second line represents lifetime income should she decline the offer. In this period the decision whether or not to accept the offer is not clear-cut. It depends on the probabilities p and q and the parameters of the model. Subtracting the second expression from the first, we obtain the following index:

$$N = (s - v) + [p(1 - q)(w^F - v)] \frac{1}{(1 + r)} \quad (6)$$

The wife will accept an offer in period 1 if N is positive, and she will turn down the offer if N is negative.

Equation (6) shows that the decision problem in the static framework introduced at the beginning of the paper is a special case of the dynamic problem. The wife's participation decision in a static context corresponds to the dynamic problem where the wife, regardless of her period 1 decision, is always offered the same job in the future, $q(0) = q(1) = 1$, or the husband stays unemployed for the rest of his life with certainty, $p = 0$. For $p = 0$ or $q = 1$, the wife's decision problem in period 1 depends solely on whether $s > v$ (accept offer) or $s < v$ (reject). She need pay no attention to future income streams. However, for $0 < q < 1$ and $0 < p \leq 1$, it may be rational to accept the period 1 offer even though income in that period is lower as a result ($s < v$).

Comparative statics of (6) yield:

$$dN = (1 + r) ds - [(1 + r) + p(1 - q)] dv - (v - s) dr + \\ (1 - q)(w^F - v) dp + p(1 - q) dw^F - p(w^F - v) dq \quad (7)$$

The wife is less likely to turn down the period 1 job offer if her earnings are high and if the probability that her husband receives a job offer in the next period is high. High opportunity costs of the job offered to her, a high discount rate, and a high probability of receiving an offer in period 2 should she not work in period 1, all favour the likelihood that she will not accept the period 1 offer.

The wife's net contribution to household income, s , is a function of the level of her husband's unemployment benefit, b , the disregarded level of her earnings, k , and her earnings, w^F : $s = s(b, k, w^F)$. Holding w^F constant, it follows that $ds = [\delta s / \delta k] dk + [\delta s / \delta b] db$, with

$$\frac{\delta s}{\delta k} \quad \begin{cases} > 0 & : w^F \leq b + k \\ = 0 & : w^F > b + k \end{cases} \quad (8)$$

$$\frac{\delta s}{\delta b} \quad \begin{cases} < 0 & : w^F > b + k \\ = 0 & : w^F \leq b + k \end{cases} \quad (9)$$

Should the wife's job result in the means-test applying at the margin, $w^F \leq b + k$, an increase in the disregarded level k favours her decision to participate. The level k depends on the structure of the benefit system and differs among countries. Other things equal, one would expect the participation rate of wives married to unemployed men to be higher in those countries with a relatively high k . A change in k will not affect the wife's period 1 decision should the job offered to her not result in the means-test applying at the margin, $w^F > b + k$. An increase in the husband's unemployment benefit does not affect the participation decision if the job offered to the wife is such that the means-test binds at the margin, $w^F \leq b + k$. But it provides a disincentive effect by reducing the wife's net contribution to family income should w^F be larger than $b + k$.

Risk-averse behaviour

Although the assumption of risk-neutrality is often adopted in the analysis of the behaviour of the unemployed, for example in the basic job search model, it seems sensible to consider risk-aversion for this group of persons. With the assumption that

the family is risk-averse we can no longer simplify the problem to one of maximising lifetime income. The indirect utility function must now be strictly concave rather than linear as in the risk-neutral case. We outline the effect of risk aversion on the wife's period 1 decision diagrammatically.

To do this, we assume that the husband will receive a job offer in the next period with certainty: $p = 1$. One can think of this representing the situation where all male unemployment is short-term. In contrast to the situation where $p = 0$, this simplification concerning the husband's prospects does not return us to the static model. The crucial uncertainty in the dynamic model remains: the risk that the wife does not receive a job offer in period 2 if she turns down a job offer in period 1.

The certain prospect for the family results if the wife accepts the period 1 offer. This guarantees the wife a further job offer in period 2. Under our simplifying assumption the husband is also guaranteed an offer in that period. Lifetime utility in the certain prospect, V^c , is given by

$$V^c = V(I^c) \quad \text{where } I^c = b + s + (w^M + w^F)/(1 + r) \quad (10)$$

The uncertain prospect results if the wife rejects the offer in period 1. There will then be two possible states in period 2: she will receive a further job offer (state A) or she will receive no job offer (state B). The expectation of lifetime utility in this uncertain prospect, V^u , is given by:

$$E(V^u) = q V(I^A) + (1 - q) V(I^B) \quad (11)$$

where $I^A = b + v + (w^M + w^F)/(1 + r)$ and $I^B = b + v + (w^M + v)/(1 + r)$. The problem is illustrated in Figure 2 in state-contingent income space. The family's lifetime income should state A realize - the good prospect - is measured along the horizontal axis, and lifetime income in state B - the bad prospect - along the vertical axis. For some values of w^F , v , s and w^M , which satisfy the assumption $w^F > v > s$, point γ represents the two possible family incomes should the wife make the risky choice by turning down the period 1 offer. Point θ represents lifetime income if the

wife accepts the offer. Income in this case is certain and θ therefore lies on the 45 degree line. The indifference curve $V - V$ represents the family's preferences under risk-aversion. The tangent to this curve at the point of intersection with the certainty line has slope $q/(1 - q)$, the odds ratio of the wife receiving a job offer in period 2. This tangent also corresponds to an indifference curve in the case of risk neutrality.

[Figure 2 about here]

In the case depicted in the diagram by point γ the wife would decide to accept the period 1 offer if the family is risk averse, and she would not if the family is risk neutral. Aversion to the uncertainty surrounding income in period 2 leads her to accept that offer despite expected lifetime income being lower as a result. Since the convexity of the indifference curves depend on the degree of risk aversion, one can conclude that higher risk aversion will increase the likelihood of acceptance of the period 1 offer.

The indifference curve will pivot around the point θ if the probability that the wife receives an offer in period 2 changes. Point γ will move along the line α, α if the opportunity cost v changes. The diagram thus illustrates some of the comparative static results obtained earlier in the risk-neutral case. An increase in q and in v will both favour the decision to turn down the period 1 job offer.

3 Conclusions

The possible effects on labour supply of unemployment benefit have provoked a multitude of research studies. In this paper we have looked at an aspect of the subject which has been largely overlooked within this research effort: the effect of means-testing unemployment benefit on the labour supply of the claimant's family. Given the importance of means-testing in some countries' unemployment benefit systems this is a subject deserving serious attention.

In addressing the issue we have emphasised that a number of features need to be taken into account in order to obtain insight into the impact of the means-test. In

particular, it is not sufficient in our view to analyse this subject in a static framework. The temporary nature of the means-test on the one hand, lasting only so long as the claimant remains unemployed, and state dependence in transition probabilities in the labour market on the other, mean that intertemporal considerations can be expected to enter the labour supply decisions of a family faced with means-test disincentives.

To analyse the problem we set up a two-period model of the incentives facing a married couple. The wife's decisions in the first period while her husband was unemployed had implications for her job offer probabilities in the second. The analysis showed that uncertainty surrounding the second period could induce participation behaviour that seemed to be sub-optimal in a simple static framework, namely the wife working despite her net contribution to family income being zero.

The participation rates of women married to unemployed men may be affected by means-testing in those countries with benefit systems which involve a means-test on family income. Our analysis suggests that a simple explanation in terms of high implicit marginal rates of tax should be treated with caution. Any disincentive effect is likely to vary, amongst other things, with the employment prospects of both husband and wife and their degree of risk aversion.

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FIGURE 1
WIFE'S NET CONTRIBUTION TO FAMILY INCOME

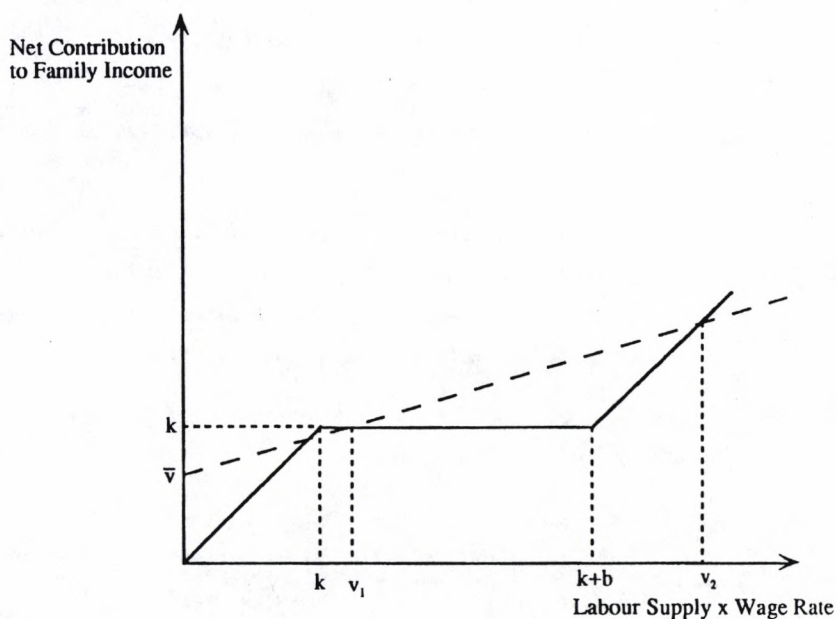
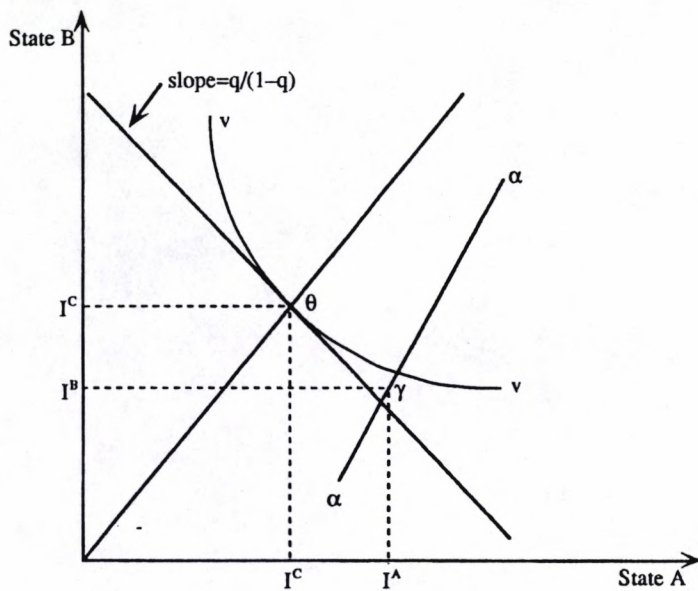


FIGURE 2
CHOICE UNDER RISK-AVERSION





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